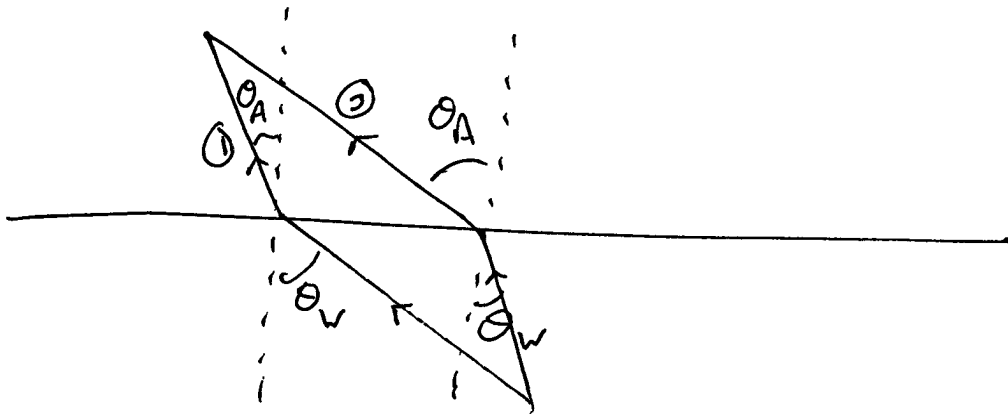
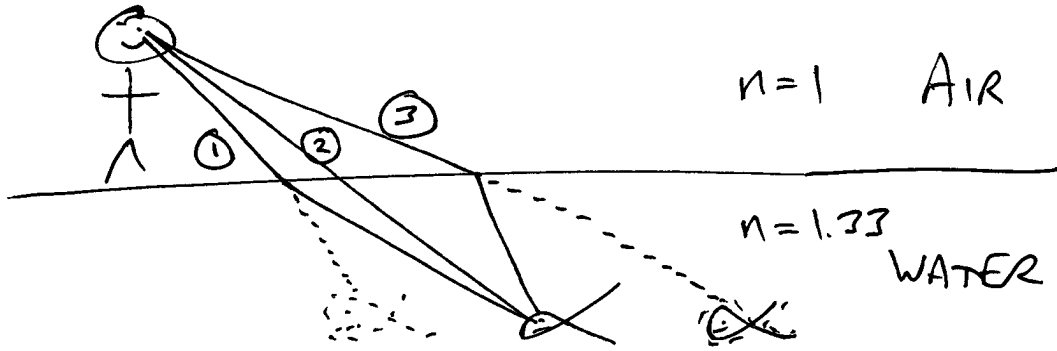


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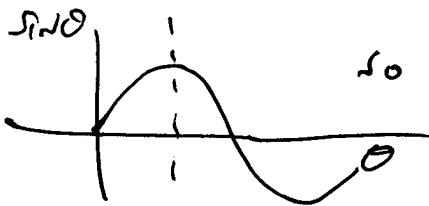
$$n_A \sin \theta_A = n_W \sin \theta_W$$

FOR PATH ①,  $\theta_A < \theta_W$

FOR PATH ③,  $\theta_A > \theta_W$

WE KNOW  $n_A < n_W$

SO  $\sin \theta_A > \sin \theta_W$

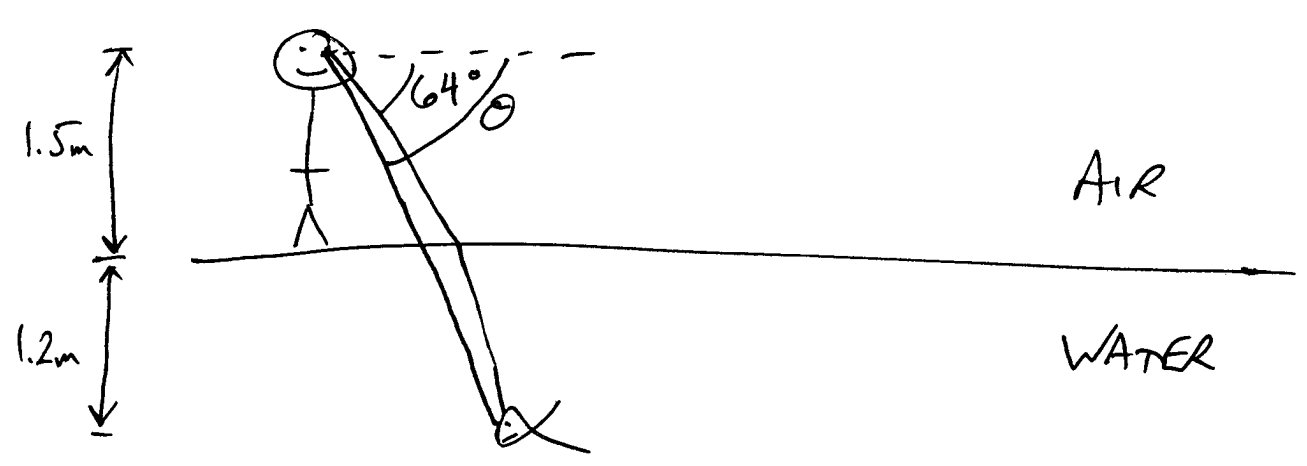


SO  $\theta_A > \theta_W$

WE WANT PATH ③

LIGHT IN THE HIGHER-INDEX MATERIAL IS CLOSER TO PERPENDICULAR.

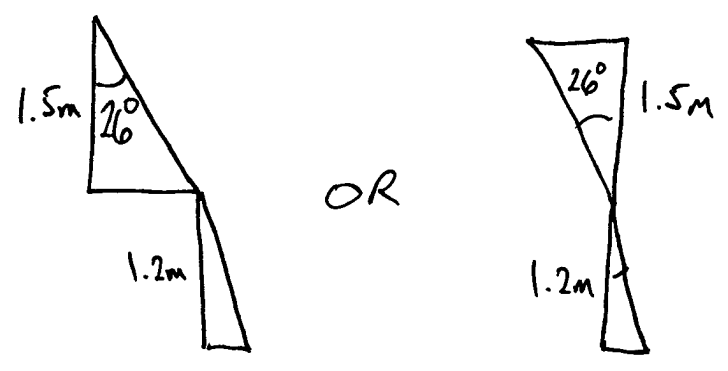
# SAFARI PROBLEM



FIND  $\theta$ . EXPECT  $\theta > 64^\circ$

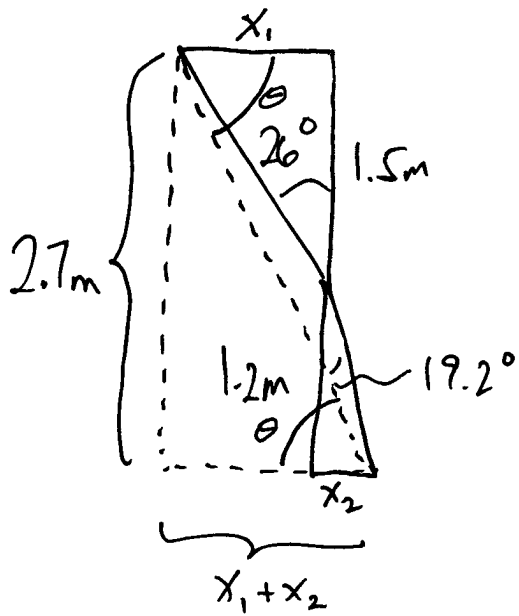
## SUGGESTIONS

- ① USE SNELL'S LAW
- ② MAKE TRIANGLES



$$n_A \sin \theta_A = n_w \sin \theta_w$$

$$(1) \sin 26^\circ = (1.33) \sin \theta_w \Rightarrow \theta_w = 19.2^\circ$$



$$\text{TAN } 26^\circ = \frac{x_1}{1.5\text{m}}$$

$$\Rightarrow x_1 = 0.73\text{m}$$

$$\text{TAN } 19.2^\circ = \frac{x_2}{1.2\text{m}}$$

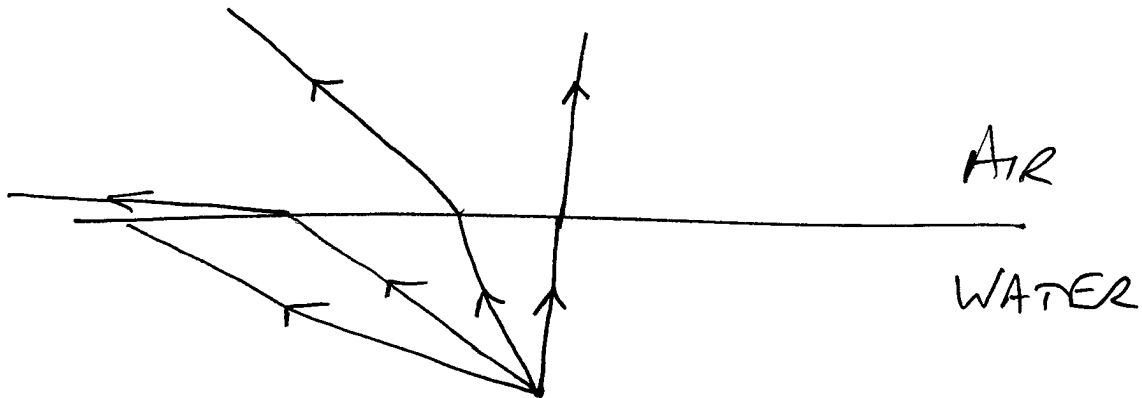
$$\Rightarrow x_2 = 0.42\text{m}$$

$$\text{TAN } \theta = \frac{2.7\text{m}}{x_1 + x_2}$$

$$\theta = \text{TAN}^{-1} \left( \frac{2.7\text{m}}{1.15\text{m}} \right) = 67^\circ$$

# TOTAL INTERNAL REFLECTION

4



THERE IS A CRITICAL ANGLE.

LIGHT STARTING IN THE HIGH-INDEX MATERIAL WITH AN ANGLE OF INCIDENCE GREATER THAN THE CRITICAL ANGLE ~~WILL~~ WILL NOT GET REFRACTED.

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \quad n_2 > n_1$$

$$\uparrow \\ 90^\circ$$

$$n_1 = n_2 \sin \theta_c$$

$$\theta_c = \sin^{-1} \left( \frac{n_1}{n_2} \right)$$

APPLICATION: FIBER-OPTIC CABLE

